CORRECTING STUDENT MISCONCEPTIONS ABOUT NUTRITION, HEALTH, AND WELLNESS

BY

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Abstract

False information can have a lasting impact on a person's decision-making and reasoning abilities. College students, for example, have been shown to develop unhealthy behaviors possibly due to a lack of factual nutrition information. Previous efforts to correct false beliefs revealed that it is difficult, but not impossible to lower the influence of misconceptions. The purpose of the current study was to explore whether the type of correction influenced belief change (posttest scores). Additionally, the researcher sought out to study the impact self-esteem level had on the overall success of corrections. First, participants were exposed to true and false health statements. They were then randomly assigned to receive either simple corrections to the false statements, detailed corrections, or none at all. Self-esteem levels were also measured. Analyses revealed that there were significant main effects of time and of correction type. Self-esteem did not have a significant main effect. On average, posttest scores for the control group were significantly lower than both the simple and detailed correction groups; however there was no difference between scores for the simple and detailed correction groups. Present findings contribute to existing recommendations for successfully correcting misinformation.

Correcting Student Misconceptions about Nutrition, Health, and Wellness

The college years are a critical time for the development of health behaviors that persist later in life. Surveys show that young adults tend to engage in detrimental health practices such as decreased physical activity, increase in alcohol and tobacco use, and poor dietary practices once they begin college (Consineau, Goldstein, & Franko, 2010). Evidence also suggests that adolescents and young adults experience a decline in physical activity during early adulthood (U.S. Department of Health & Human Services, 2008). This may be due to increased stress levels and reports of feeling overwhelmed from balancing classes, schoolwork, social and sexual pressures (Brougham, Zail, Mendoza, & Miller, 2009). Given these shifts in unhealthy behaviors, it is crucial that college students are informed about how to properly attain or exceed satisfactory wellness levels. They must be fully aware of the health benefits of eating a balanced diet and exercising regularly.

Individuals located across the globe are now more connected than ever before due to round the clock advances in technology. Having the ability to surf the Web, for example, exposes individuals to great amounts of content. Clearly the Internet is a valuable tool, however there is a vast amount of false information available online. When considering the dissemination of false information, it is important to note the social media sites that allow for instant communication between users. The presence of students in social media networking websites is huge. Social networking sites such as Facebook and Twitter, are used by an estimated 90% of college undergraduates and 90% of high school students (Manago, Taylor, & Greenfield, 2012). These sites disseminate false information to young people at an alarming rate (all posts are easily accessed by anyone with a profile depending on privacy settings). This is problematic because misinformation is difficult to correct and can have a lasting impact on a person's decision-

making abilities (Cook & Lewandowsky, 2011). In numerous cases, experiencing poor health can be a direct result of believing false online content is true. Students should have access to trustworthy sources both on-campus as well as online source deliberately correct health myths and misconceptions.

Previous findings reveal a tendency for individuals to favor information that is congenial to their attitudes (Wiersema, 2010). Attitude not only creates biases, it also directly impacts a person's willingness to process counter-attitudinal information into memory. The congeniality effect on memory refers to the hypothesis that people have better memory for information that supports or confirms their attitudes than for information that stands in contrast with these attitudes (Eagly, Chen, Chaiken, & Shaw-Barnes, 1999). It is assumed that material congenial to people's preexisting attitudes is more readily learned and retained in memory. It is necessary to further examine whether self-esteem, or a person's evaluation of his or her own worth, affects people's memory, reasoning, decision-making, and problem-solving abilities upon receiving factual information.

The task of correcting misinformation may be difficult, but some strides have been made within the field of cognitive psychology towards this goal. According to Lewandowsky and colleagues, a few effective strategies for correcting misinformation include highlighting the facts rather than the myths and strengthening the overall message through repetition (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). It is also crucial that the factual information or the "take away message" is presented in a simple and clear manner. The current study takes these recommendations a step further by manipulating the depth of corrections. Participants will be exposed to common health myths, followed by detailed retractions, simple retractions, or no retractions at all. In the study, I will manipulate the amount of detail included with each

correction while specifically examining the role that self-esteem plays, if any, on correcting health-related misconceptions. The following review of literature will discuss current findings related to the task of correcting misinformation. More specifically, research concerning cognition, memory, and self-esteem will be discussed.

Literature Review

Influence of Misinformation

Misinformation is defined as information that is initially believed to be true but is later retracted or corrected (Ecker, Lewandowsky, Fenton, & Martin, 2013; Ecker, Lewandowsky, Swire, & Chang, 2011). Regardless of the way it is transferred, misinformation poses a threat to society when people form their beliefs and opinions on the basis of fabricated stories or lies. Those that are equipped with fiction rather than fact may make decisions for themselves and for their loved ones that can have serious negative consequences (Lewandowsky et al., 2012).

The pervasiveness of misinformation in our society is one of great public concern due to the complexities involved in reducing the influence of misinformation (Cook & Lewandowsky, 2011). People simply do not update conclusions in an efficient manner following the availability of factual information. Because rejecting information requires great cognitive effort, people are likely to believe the initial piece of information although it is false. The case of scientist Dr. Andrew Wakefield provides an example of how untrue information can impact our actions and how we interpret what occurs in our world.

Consider the following example: In 1998, Dr. Andrew Wakefield claimed to have found a link between childhood vaccinations and autism. Parents in both Britain and the United States were impacted by these reports. According to Cohen and Falco (2011), vaccination rates in Britain declined to around 80% following the publication of Wakefield's paper. In the United

States, the highest number of measles cases was reported in 2008 than any other year since 1997. It was not until 2010 that the link between the vaccinations and autism was discredited and the original paper was retracted (Godlee, Smith, & Marcovitch, 2011). Dr. Wakefield's studies have been repeatedly retracted and disconfirmed, yet his original findings continue to cause parents to refuse to expose their children to vaccines that are actually safe. Such persistence of misinformation and its growing effect on areas related to public health, public policy, politics, and public discourse (McCarthy, 2014) has increased the need to better understand the negative impact of false beliefs and the tendency for people to rely on misinformation although they know it is false.

The Continued Influence Effect

The case described above is one of many that highlight the pervasiveness of misinformation despite repeated corrections. The continued influence effect occurs when people cling to misinformation even after clear retractions (Guillory & Geraci, 2010; Lewandowsky, Ecker, Seifert, & Schwarz, 2012; Wilkes & Leatherbarrow, 1988). Numerous studies have employed a similar procedure for exploring this phenomena. Typically, the researcher will present participants with a fictitious account of an event. A piece of information is disseminated for one group of participants and then the information is retracted (Ecker et al., 2013). The remaining groups typically receive no corrections. Afterwards, participants are given a questionnaire in which they must make inferences regarding the event or some sort of assessment intended to test for memory of the event. The researcher will then compare the number of references made to the initial information for both the retraction and the non-retraction groups. This method allows the researcher to examine the effectiveness of the retractions in correcting misinformation.

A pioneer study conducted by Wilkes and Leatherbarrow (1988) was one of the first to examine the continued influence effect. The goal of this study was to uncover the processes involved in discounting misinformation following a retraction. The researchers presented participants with a fictitious news report regarding a warehouse fire. A key piece of information about what started the fire was subsequently retracted for some, while the control group received no retraction. The researchers found that participants in the correction groups continued to make a significant number of inferences using the initial information (that the fire was started by improperly stored gas cylinders). Even though they acknowledged retractions, they continued to rely on pieces of information that they knew were false. These results suggest that people fail to update their memories after receiving clear retractions.

Subsequent studies have drawn similar conclusions as Wilkes and Leatherbarrow (1988). Lewandowsky et al. (2012), found that corrections at most halved the number of references made to initial pieces of information even when people had a clear understanding of said correction. In a study that examined the impact of racial attitudes on the success of retractions, Ecker et al. (2013) presented a news report regarding a liquor store robbery to participants that scored higher versus lower on a racial prejudice test. Three reports that differed in the racial description of the suspects were presented. It was found that retractions significantly reduced, but did not eliminate references to the racial background of suspects. In both studies, it is clear that the influence of false information remained significant despite strong retractions. Additionally, Guillory and Geraci (2010) found that younger adults and older adults were equally affected by the continued influence effect.

An experiment conducted by Ecker, Lewandowsky, Swire, & Chang (2011) also involved the dissemination of a report that contained misinformation. Participants read the report and then

responded to a questionnaire regarding the events described in the report. The researchers manipulated the strength of the misinformation by repeating the false information once or three times; strength of corrections was manipulated by repeating the factual information never, once, or three times. Results fall in line with those of previous studies that have attempted to correct misinformation: multiple retractions did not completely eliminate the continued influence effect.

In studying the continued influence effect it is crucial to note the impact of fluency and consistency. The term fluency refers to the speed and ease by which messages are processed, while consistency refers to content matches. Information that is fluid and consistent with prior knowledge is processed with ease. This ease of processing allows for reliance on that information regardless of its truth value. On the other hand, some level of psychological discomfort is expected (Winkielman, Huber, Kavanagh, & Schwarz, 2012) when there is a lack of fluency and consistency. This means that people tend to process information that is consistent with what they already believe more willingly than information that contradicts their beliefs (Albarracin & Mitchell, 2004). This is one explanation for the inability of retractions to completely eliminate the misinformation effect.

Self-Esteem and its Role in the Congeniality Hypothesis

Correcting misinformation can be a daunting task when misinformed persons have biases. People usually form said biases based on preexisting beliefs and attitudes. Weldon (1981) stated that, “Attitude acts as a frame of reference that facilitates attention to and encoding of congenial statements.” This means that people favor information that is consistent with their attitudes while resisting that which contradicts these attitudes. This phenomena is referred to as the congeniality hypothesis. In a study conducted by Wiersema (2010), it was predicted that participants with higher self-esteem would memorize a greater amount of counter-attitudinal statements than

participants with lower self-esteem. Results showed that high self-esteem people remembered counter-attitudinal information at a higher rate than lower self-esteem people. Lower self-esteem people retained more congruent information because it was less threatening to their sense of self. Similarly, a study conducted by Albarracin & Mitchell (2004) set out to determine if self-esteem level contributed to a preference for certain information. Results showed that people with lower self-esteem tended to favor pro-attitudinal information opposed to information that contradicted their beliefs.

Saunders (2012) tested for memory errors in high and low self-esteem participants as well. The researchers expected to detect a change in beliefs following the experimenter's post-event suggestions in lower self-esteem individuals more so than in individuals with higher self-esteem. They found that for those with high self-esteem, no differences were detected for salient and non-salient items. However, in the low self-esteem group, misled participants reported the non-salient original item less often than the non-misled group. This means that higher self-esteem participants did not experience the misinformation effects. Those with lower self-esteem were more suggestible to the leading questions of the experimenter.

Despite findings in support of the congenial hypothesis, contradicting evidence does exist. A meta analysis conducted by Eagly and colleagues (1999) included studies that examined memory for both favorable and unfavorable information. The analysis revealed that memory was slightly better for attitudinal congenial information than for uncongenial information. Still, after taking moderators into account, the researchers concluded that the tendency for preexisting attitudes to bias memory in a congenial direction was low. In this case, the congeniality effect was inconsistent across numerous experiments. It appears as though a gap in the existing

literature does exist. Further investigation concerning the influence of self-esteem on belief change was carried out within the present study.

Current Study

Previous studies reveal a tendency for misinformation to persist in memory despite retractions and it has been noted that self-esteem may play a role in the effectiveness of retractions. In the past, attempts have been made to correct misconceptions by varying the frequency of retractions (Ecker, Lewandowsky, Swire, & Chang, 2011). It is possible that more in-depth retractions are needed to correct misconceptions. Differences between the information-processing abilities of people with higher versus lower self-esteem also have been studied previously. Not much is known about how self-esteem level may influence efforts to update memory following a retraction although previous literature reveals that self-esteem may influence on the success of corrections. This poses a challenge to researchers, institutions, and other entities that attempt to correct misconceptions.

The proposed study will attempt to correct misinformation about nutrition, health, and wellness in both higher and lower self-esteem people. Providing factual information related to health and wellness is critical, especially during early adulthood. One research questions for the proposed study is: Does correction type (none, simple, detailed) impact one's ability to update beliefs about health and wellness accordingly? It was hypothesized that the simple negations will be less effective in changing false beliefs than the detailed negation (Wilkes & Leatherbarrow, 1988). The second research question is: Does self-esteem impact one's ability to update (health and wellness) beliefs following a correction? It was hypothesized that participants with higher self-esteem will more readily update beliefs to reflect accurate information while those with

lower self-esteem will resist corrections if they contradict preexisting beliefs and attitudes (Albarracin & Mitchell, 2004; Saunders, 2012; Wiersema, 2010).

The researcher will manipulate the type of correction given to participants. There will be three groups total: the detailed correction group, simple correction group, and the control no correction group. The simple correction group will receive simple negations to all health myths while the detailed negation group will receive a negation plus a detailed explanation as to why the piece of information is false. Furthermore, all participants will respond to a self-esteem measure. The researcher not only hopes to correct the false information, but also to encourage participants to retain the factual information. Once presented with factual information, participants will be better equipped the factual nutrition, health, and wellness knowledge to carry out a healthier lifestyle.

Methodology

Participants

Spelman College students were recruited to participate in the study. The results of a power analysis revealed that at least 84 students must participate in the study in order to find a statistically significant difference if one does exist. A total of 55 students participated in the study. Participants ranged in age from 18-22 years old. Because Spelman College is a woman's college, all participants were female. Students of all classifications and all majors were permitted to participate in the study as long as they were over the age of 18 years old and provided consent prior to completing the online questionnaire. Participants were excluded if they did not provide consent or were not at least 18 years old. For recruitment purposes, a mass email was sent out to the student body requesting student participation. The email stated the name and classification of the researcher and provided a brief description of the proposed study. Students were asked to

volunteer 10-15 minutes of their time to complete the questionnaire. All participants were entered in a raffle and two winners were compensated with a $25 gift card.

Materials

The Nutrition, Health, and Wellness Survey is an online questionnaire that assessed initial beliefs about common health statements. The survey presented 7 false health statements (*e.g., Dieting alone will lead to a significant amount of weight loss)* and 3 factual health statements (*e.g., It is important that I eat nutritious foods and exercise regularly*). Participants rated their level of agreement with each statement on a 5-point Likert scale (see Appendix A). Scores on this measure ranged from 0-40. After completing the survey, participants in the control condition were asked to read an article that has no relevance to the current research study (Contie, Defibaugh, Steinberg, & Wein, 2013).

Participants in the simple negation condition were presented with each health statement followed by text that read, "*This statement is false*" or "*This statement is true*." Those in the detailed correction condition were presented with each health statement followed by text that read, "*This statement is false*" or "*This statement is true.*" In addition to that they also received a detailed explanation as to why the statement is either true or false (e.*g., "Dieting alone will lead to a significant amount of weight loss. This statement is false. Weight loss requires burning more calories than you consume."*).

The Rosenberg Self-Esteem Scale (1965) was used to measure self-esteem. It is a 10-item test that measures global self-esteem (see Appendix B). Participants were labeled as having either high or low self-esteem based on their total score on the self-esteem scale. The scale ranges from 0 to 30. Those that scored between 15 and 25 were placed in the high self-esteem group. Those that scored below 15 were placed in the low self-esteem group. Participants rated

overall feelings of self-worth. The test was scored on a 4-point Likert scale ranging from strongly agree to strongly disagree. The criterion validity of this measure is .55. The internal consistency ranges from .77 to .88 and test-retest ranges from .82 to .85 (Rosenberg, 1965).

Procedure

Participants were recruited through email as well as through flyers that were posted in academic buildings on campus. Each participant received a direct web link that provided access to the Nutrition, Health, and Wellness Survey and Self-Esteem Scale. First, participants provided consent. Once consent was obtained, participants responded to the Nutrition, Health, and Wellness Survey (pretest). Next, all participants were randomly assigned to one of three levels of the independent variable (correction condition). They received either no correction, a simple correction, or a detailed correction to each health statement. Participants then completed the same Nutrition, Health and Wellness Survey that was given at the beginning of the study a second time (posttest), followed by the Rosenberg Self-Esteem Scale (1965). Lastly, a few demographic questions were asked. Upon completion of the survey, participants were debriefed.

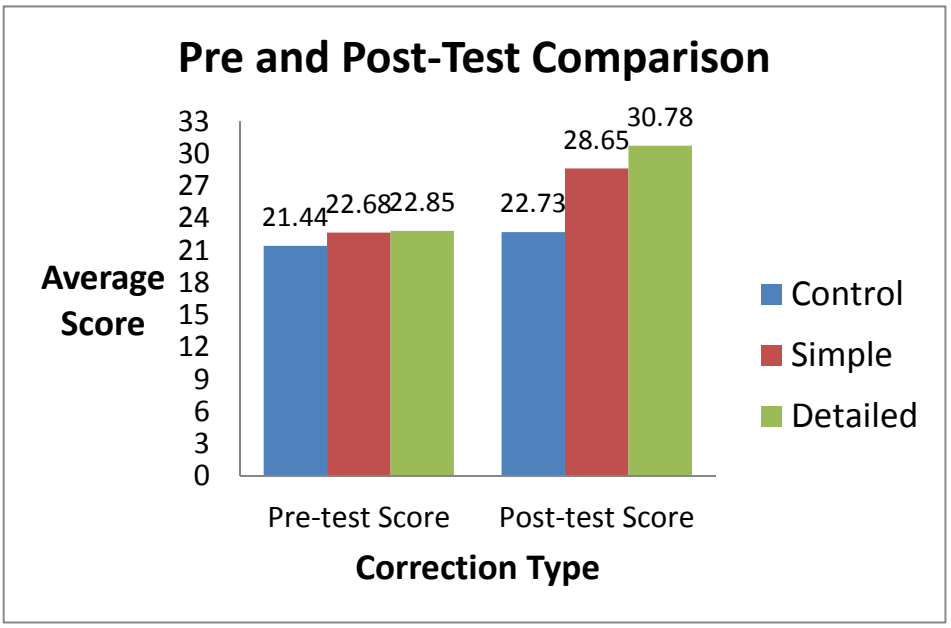
Data Reduction

Agreement with each statement on the Nutrition, Health, and Wellness Survey was scored based on a self-reported measure. Participants chose their level of agreement with each statement on a 5-point Likert scale ranging from strongly agree to strongly disagree. Pre-test and post-test scores were computed by adding up responses to the 10 health statements. The untrue statements were scored as follows: strongly agree=0, agree=1, neither agree nor disagree=2, disagree=3, and strongly agree=4. The factual statements were reverse coded (strongly agree=4, agree=3, neither agree nor disagree=2, disagree=1, strongly disagree=0). The highest possible score for the Nutrition, Health, and Wellness Survey is 40. A score of 40 would indicate

completely accurate beliefs concerning health. Self-esteem was scored using the Rosenberg Self-Esteem Scale (1965). Participants that did not respond to post-test survey items in their entirety were not included in the preliminary data analysis.

Results

A 3 (correction type: simple, detailed, no correction) x 2 (self-esteem: high or low) mixed repeated measures ANOVA was used to analyze the differences between pretest and posttest means (belief change). In total, 55 participants were included within the data analysis. There were 16 participants in the control group, 19 in the simple correction group, and 20 in the detailed correction group. Results of the ANOVA revealed that there was a significant main effect of time, F(1, 44)=8.86, $p<.01$, $\eta^2_p=.17$,and a significant main effect of condition, $F(2,44)=7.01$, $p=.002$, $\eta^2_p=.24$. There was also a significant interaction between time and correction condition, F(2, 44)=6.37, p=.004, $\eta^2_p=.23$. The main effect of self-esteem was not significant, F(1, 44)=1.76, p=.192. Furthermore, follow up comparisons indicated that posttest scores for the control group were significantly lower than posttest scores for the simple and detailed conditions, (M = 22.73, SD = 3.83). The difference between posttest scores of the simple and detailed conditions was not significant, $t(33)=-1.12$, $p=.27$.



Discussion

Summary and Conclusions

The current experiment manipulated the depth of corrections delivered to participants following the presentation of both true and false health statements. The researcher also examined the influence of self-esteem on belief change. Results indicate that the simple negation correction was not less effective than the detailed negation condition. This means that providing factual detail as to why a myth is untrue did not create a greater belief change than simply stating that the statement is false. Furthermore, participants with high self-esteem did not display a greater belief change than low self-esteem participants as predicted. Results indicate that low self-esteem people and high self-esteem people have do not differ in their abilities to update memory upon receiving a retraction. The two hypotheses that drove the present study were not supported by the data analysis.

Results of the 3 x 2 repeated measures ANOVA also indicated main effects of time (within subjects factor) and correction condition (between subjects factor). Between the two time points, scores were different from each other. Furthermore, the type of correction directly impacted posttest scores. The interaction between time and correction was also statistically significant. This means that there were significant differences in survey responses between the pre-assessment and the post-assessment for all groups. Over the two time points in which participants completed the Nutrition, Health, and Wellness measure, all three groups displayed increased scores. This was expected for the simple and detailed correction conditions because these participants were made aware that certain statements they encountered in the survey were false. On the other hand, those in the control group received no correction, yet their scores still increased. This may be due to repeated exposure to the measure.

Implications and Recommendations

When trying to correct myths, efforts should be taken to explain why a statement is untrue. Providing clear and simple detail will assist in updating memory for the factual information. Self-esteem is of great importance because it is a reflection of a person's feelings towards themselves. The present study did not find an effect of self-esteem on belief change however future research should take this variable into consideration. More contributions to the literature on self-esteem and belief change are needed. These findings could potentially change the ways in which corrections are delivered to all people. Also, the present study administered the pre and posttest in the same sitting. Future studies in the field should conduct belief change experiments that not only vary the type of correction, but also the time between pre and posttest assessments. This manipulation of time would allow researchers to see whether individuals can successfully update their memories to reflect factual information.

At times, simply believing in health misconceptions can put individuals at risk. Being misinformed about the proper way to achieve wellbeing in particular may result in health declines. For these reasons, more action should be taken on college campuses to combat health-related misconceptions. Mental and physical health services on campus should devote time, energy, and resources into debunking myths. Students should also be encouraged to seek out guidance from health professionals on campus who have been trained as advocates of health and wellness. We must utilize past, present, and future findings to create an environment on college campuses that allows for safe and healthy growth.

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Appendix A
Nutrition, Health, and Wellness Survey

Pre-Test

Please rate your level of agreement with each statement below.

1. Carbohydrates ("carbs") are fattening. I should limit them when trying to lose weight.
2. I will lose weight at a faster rate by only doing cardio (i.e. treadmill, elliptical, bike).
3. Frozen produce are nutritionally equal to fresh produce.
4. Eating multiple small meals each day will boost my metabolism.
5. Dieting alone will lead to a significant amount of weight loss.
6. Being overweight is genetic. If it runs in my family, I cannot prevent it.
7. Being healthy comes from a balance of regular physical activity and healthy eating.
8. I should not eat after a certain time of night (i.e. 8 PM) if I want to lose weight.
9. Age is on my side so I do not have to exercise now.
10. The blood pressure reading for an adult should normally be less than 120/80 mmHg.

**Participants rated their level of agreement with each statement on a Likert scale ranging from 1-5 (strongly agree to strongly disagree)*

Interventions

Participants were randomly assigned to one of three levels of the correction type (control, simple correction, or detailed correction).

Control (no correction): Participants read an article (Contie, Defibaugh, Steinberg, & Wein, 2013). They did not receive any corrections or explanations to the statements presented in the pre-test.

Simple correction**:** Participants in this correction condition viewed each health statement again followed by **"***This statement is false*" or "*This statement is true*."

Detailed correction**:** Participants in this correction viewed each health statement again followed by **"***This statement is false*" or "*This statement is true*." Additionally, a detailed explanation as to why the statement is either true or false was provided.

Rosenberg Self-Esteem Scale (1965)

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

See Appendix A for questions.

Relevance Questions

Please respond to the following questions truthfully.

1. I believe the “Wellness Revolution” underway at Spelman College is beneficial to the student body.
2. It is important that I eat nutritious foods and exercise regularly.
3. Living a healthy lifestyle is not something that concerns me.

**Participants rated their level of agreement with each statement on a Likert scale ranging from 1-5 (strongly agree to strongly disagree)*

Please indicate below how often you partake in each activity. Always sometimes never

1. Skipping meals
2. Eating fast food
3. Use of fad diets

(Always, Sometimes, Never)

How many times a week do you get at least 30 minutes of physical activity?
(0 times, once a week, twice a week, 3-4 times a week, 5-6 times a week, 7 times a week, Other)

About how many hours of sleep do you get per night?
(Participants instructed to choose between 0 hours to 12 hours)

Demographics

1. What is your age?
2. What is your classification?
3. What is your major?
4. What is your racial/ethnic background?

Appendix B

Rosenberg Self-Esteem Scale (1965)

	STATEMENT	Strongly Agree	Agree	Disagree	Strongly Disagree
1.	I feel that I am a person of worth, at least on an equal plane with others.	☐	☐	☐	☐
2.	I feel that I have a number of good qualities.	☐	☐	☐	☐
3.	All in all, I am inclined to feel that I am a failure.	☐	☐	☐	☐
4.	I am able to do things as well as most other people.	☐	☐	☐	☐
5.	I feel I do not have much to be proud of.	☐	☐	☐	☐
6.	I take a positive attitude toward myself.	☐	☐	☐	☐
7.	On the whole, I am satisfied with myself.	☐	☐	☐	☐
8.	I wish I could have more respect for myself.	☐	☐	☐	☐
9.	I certainly feel useless at times.	☐	☐	☐	☐
10.	At times I think I am no good at all.	☐	☐	☐	☐